TRINITY RIVER BRIDGE
(East Belknap Street Bridge)
Texas Historic Recording Project II
Spanning the Trinity River at E. Belknap St. (U.S. Hwy. 377)
Fort Worth
Tarrant County
Texas

HAER No. TX-88

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
U.S. Department of the Interior
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Washington, DC 20240

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Location:	Spanning the West Fork of the Trinity River at U.S. 377, Fort Worth, Tarrant County, Texas UTM: West 14/658020/3626580 East 14/658200/3626683 USGS Quad: Haltom City, Tex.
Date of Construction:	1932
Designer:	George G. Wickline, Texas Highway Department
Builder/Contractor:	Buckner Brothers, Cleburne, Texas
Present Owner:	Texas Department of Transportation
Present Use:	Roadway bridge
Significance:	This structure, which exhibits several unique design elements, is one of only four known examples of a reinforced concrete cantilever span bridge constructed by the Texas Highway Department. Along with the nearby Belknap Street Viaduct, it represents a notable introduction to Fort Worth for motorists entering the city from the northeast on U.S. 377.
Historian:	Robert W. Jackson, Ph.D., August, 2000
Project Information:	This document was prepared as a part of the Texas Historic Bridges Recording Project II performed during the summer of 2000 by the Historic American Engineering Record (HAER). The project was sponsored by the Texas Department of Transportation (TxDOT), Environmental Affairs Division.

INTRODUCTION

The Trinity River Bridge was built by the Texas Highway Department in 1932 as part of a plan to improve an approximately two-mile section of State Highway (S.H.) 10 (now identified as U.S. 377) between Fort Worth and the intersection of S. H. 10 and S. H. 121, just west of the small community of Birdville. This highway was an extension of East Belknap Street in Fort Worth and connected the central business district with the suburb of Riverside, and with Tarrant County communities of Keller (on S. H. 10) and Grapevine (on S. H. 121). Civic leaders in Riverside had sought construction of this highway for many years prior to annexation of the community by Fort Worth in 1922.[1]

In addition to desiring a better connection with Riverside, Tarrant County officials and Fort Worth civic leaders wished to accommodate an increase in traffic from Denton and points north on S. H. 10, and from Dallas and points east by way of S. H. 121. It was not until about 1930, however, that the city of Fort Worth began condemnation of the right-of-way necessary for construction of a bridge across the river. Improvement of S. H. 10, along with completion of the Trinity River Bridge in 1932 and the nearby Belknap Street Viaduct in 1934, helped make East Belknap Street a major eastern entrance to Fort Worth.

At the time the bridge was built, the Fort Worth city limits ran along the east bank of the West Fork of the Trinity River. The part of the river to be spanned by the bridge, and a part of S.H. 10 located west of the river, was therefore outside of city limits. This configuration resulted from the annexation of Riverside, which did not include a portion of the county between Riverside and Fort Worth.

The project planners originally assumed that federal funds would be available to cover some of the bridge construction costs. But an amendment to the Federal Highway Act, Section 4, passed 21 May 1928, prohibited the expenditure of federal funds for any bridge within or partially within the city limits of any municipality having a population greater than 30,000, as shown by the latest available federal or state census. Since the 1930 decennial census provided a population of 163,447 for Fort Worth, and the west end of the bridge would be in the city limits, the bridge was not eligible for federal funds. Therefore, the bridge construction project was re-designated State Project 977-E, after having been originally designated Federal Aid Project 591-B.

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[1] Specific information on the bridge, unless otherwise noted, has been taken from the original plans and microfilmed project correspondence files, Texas Department of Transportation, Records Management Division, Metropolitan Warehouse, Metropolitan Drive, Austin, Tex. Additional general information regarding the history of Fort Worth, Riverside, and the Tarrant County highway system, has been taken from *Tarrant County Historic Resources Survey: Upper North, Northeast, East, Far South, and Far West* (Fort Worth: Historic Preservation Council for Tarrant County, Texas, 1989), and from Janet Schmelzer, Fort Worth, Texas, in *New Handbook of Texas*, vol. 2 (Austin, Tex.: Texas State Historical Association, 1996), 1122-24.

TRINITY RIVER BRIDGE

The bridge consists, from west to east, of one 41'-3" girder span, five 42'-6" girder spans, one 39'-8" cantilever anchor arm, one 85'-0" cantilever center span, another 39'-8" cantilever anchor arm, six 42'-6" girder spans, and one 41'-3" girder span. It is approximately 717' long, approximately 53' wide, carries a roadway that is 40'-0" wide, and has two sidewalks, each 5'-0" wide. All of the non-cantilevered girders are slightly haunched at the points of support on the ends, providing visual support to the curves of the cantilevered girders.

The superstructure rests on concrete four-column bents that feature pointed arch openings, except for the two piers flanking the river channel, which have closed pointed arch indentations. The pointed arch motif is continued in the decorative concrete railing, which is composed of concrete panels segmented by pyramid-capped concrete posts and pedestals. These embellishments, along with the highly ornamental light standards originally installed, reflect the desire of the highway department to construct an structure that would be visually pleasing.

A special type of expansion joint was used for the 42'-6" girder spans that required one of the 1/4" connecting plates to be made out of a metal known as Nirosta or Rezistal KA-2, a particular type of chrome nickel steel. The Crucible Steel Company of America, located in New York City, manufactured this product and sold it through a local representative. This company was probably the successor to the American Tool Steel Company of New York, which manufactured the crucible steel used for the ribbed arches of the Eads Bridge in St. Louis (1874), the first bridge in America in which significant amounts of steel were used.

Because the bridge was constructed in the floodplain of the Trinity River, forty-eight precast concrete piles, each about 16 square, had to be driven under each abutment, and approximately twenty-four precast concrete piles, either 14" or 16" square, had to be driven under each bent. Prior to construction it was assumed that the piles driven on the west side of the river would have to be approximately 30' long, and the piles driven on the east side of the river would have to be from 33' to 40' long. During erection, however, it was determined that the piles would have to be driven considerably deeper than first thought. It also became necessary to use open caissons to sink the foundations of the piers supporting the main channel span.

The design of the bridge was patterned after the approximately 486' long West Fork Trinity River Bridge at S. H. 199 (Jacksboro Highway) in Fort Worth, also known as the Northwest Highway Bridge (also known as the Henderson Street Bridge). Completed by the Texas Highway Department in 1931, this reinforced concrete cantilever bridge utilized the same rail design as the Trinity River Bridge, but featured rounded arch bents and piers instead of the pointed arch motif used in the latter structure.

The Texas Highway Department first used the cantilevered concrete girder design in 1922

for the East Navidad River Bridge on S. H. 3 (Old Spanish Trail) in Fayette County. Designed by bridge division engineer A. T. Granger, the approximately 200' long structure featured a center span about 70' in length, flanked on each side by curved anchor arms. The U.S. Bureau of Public Roads was so concerned about use of this novel design that they sent Chief Bridge Engineer George G. Wickline a four-page letter containing suggestions for design modifications and methodology of construction.[2]

The following year, the cantilever girder design was once again employed for the approximately 500' long J. G. (Pat) Murphy Bridge over the North Concho River on S.H. 7 in Tom Green County. Under the supervision of Wickline, the bridge division designed this bridge with a main span approximately 100' in length.[3]

The Northwest Highway and Trinity River bridges in Fort Worth were apparently the last use of this design type by the Texas Highway Department, as no others have been identified. The advantage of this design was that it allowed a greater clearance between the lower portion of the span and the high water mark of the river than would be possible through use of a simple girder of equal length, given the same roadway grade.[4] Obtaining a certain minimum clearance was particularly important on the Trinity River, long considered to be potentially navigable by Dallas and Fort Worth area boosters.

George G. Wickline, a native Texan who graduated from the civil engineering program of the University of Texas in 1904, designed the Trinity River Bridge. Wickline was the first man to hold a post of state bridge engineer for the Texas Highway Department following creation of the position in 1918. Except for a brief period from 1935-38, during which he took a leave of absence to supervise construction of the Neches River Bridge near Port Arthur, he continued to serve as the highway department's premier bridge designer until his death in 1943.[5]

The construction contractor, John F. Buckner, began work on 20 July 1931, and completed

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[2] See bridge file for structure number 1498-01-002, Environmental Affairs Division, Texas Department of Transportation, Austin, Tex.

[3] See bridge file for structure number 0077-09-044.

[4] Information regarding use of cantilevered girders by the Texas Highway Department has been obtained from Historian John Murphey, Environmental Affairs Division, Texas Department of Transportation, and may be found in the file for structure 0081-01-001, Tarrant County, Environmental Affairs Division, Texas Department of Transportation, Austin, Tex.

[5] The biographical information contained in this report has been taken, unless otherwise noted, from Wickline's application for registration to practice professional engineering, a document in the files of the Texas State Board of Registration for Professional Engineers, Austin, Tex.

work on 29 August, 1932.[6] The total cost of the bridge was $179,765. The contractor was paid $166,828, with the remainder charged against preliminary engineering, lab charges, construction engineering, and contingencies. The state of Texas paid $127,424 of the total construction cost, and Tarrant County paid $52,341.[7]

Motorists were denied full benefits of the Trinity River Bridge until construction of the nearby Belknap Street Viaduct, located between the river and the central business district. But to celebrate completion of the Trinity River Bridge and groundbreaking for the viaduct, approximately 12,000 citizens of Fort Worth and nearby communities assembled on Sunday, 26 March 1933, for a parade nearly three miles long. One of the largest in the history of underpass and overpass celebrations in Fort Worth, the parade began downtown and ended at a point between the Trinity River Bridge and the future east end of the proposed viaduct. Participating in the parade were about 300 automobiles, long columns of khaki-clad Reserve Officer Training Corps (R.O.T.C.) units, the Fort Worth Police Band, the R.O.T.C. band, the Texas Womans College pep squad, the Texas Christian University band and sweetheart, an ancient touring car overflowing with A Riverside Sunshine Girls in snappy new uniforms, a truck full of Fort Worth Recreation Department singers in fluffy organdy uniforms, and myriad other celebrants.[8]

From a temporary platform built on the edge of the bridge, J. J. Hurley, former president of the Riverside Civic League and long-time advocate of the bridge and viaduct, delivered the main dedication speech. "We are grateful to the city council," he told the assembled multitude, "grateful to the railroads, grateful to the county commissioners, grateful to everybody."[9]

Following the orations of Hurley and various other government officials, approximately twenty vaudeville performers entertained on the bridge until near dark when a huge bonfire was lit just west of the structure. Revelers danced around the fire until it died to embers, and then reassembled on the bridge where fiddle players provided music for square dancing until late in the evening.

On Thursday 12 April 1934, another parade and ceremony marked dedication of the nearly complete Belknap viaduct. Although traffic was already moving across both bridges, it

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[6] The winning bid for this project was made in the name of John F. Buckner. The nameplate on the bridge, however, lists the contractor as Buckner Brothers. It is assumed that the firm name was changed while the bridge was under construction.

[7] See project correspondence file.

[8] *Fort Worth Star-Telegram*, 25 March 1933, 26 March 1933.

[9] *Star-Telegram*, 25 March 1933, 26 March 1933.

until 1950, when it became necessary to repair the caps, expansion joints, and roadway at bents six and seven, and to recondition the expansion plates at bents five and eight. Steel supports for girder spans three and four had to be installed at this time. Two years later the footings for bents four, six, seven, and eight were also repaired. At some point, perhaps during the repairs of the early 1950s, the original light standards were removed. Otherwise, the bridge is in near-original condition and retains the integrity of its design and materials.

Of the four known examples of reinforced concrete girder bridges built by the Texas Highway Department, the Trinity River Bridge is the longest overall, and has the longest main span. It features ornamental embellishments that give it a pleasing elegance and grace to complement its functionality. It is historically significant not only for its design, but for the manner in which it has served to introduce motorists entering Fort Worth's central business district from the northeast.

SOURCES CONSULTED

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